IQ2200 Network Processor

Product Brief

Highlights:

- Fully firmware-compatible and pin-compatible with IQ2000

- Double the IQ2000 performance at half the power with four, fully programmable, multi-context packet processing engines

- Flexible, High Bandwidth I/O Interface Capability

- High Performance, Patented Internal Architecture (100 Gb/s)

- CSIX-L1 Fabric Interface

- Control Plane Processor Independence (Native support for MIPS, PowerPC, and other RISC implementations)

- Specialized Co-Processors for Lookup, Order Management, Multicast Support, DMA Management, and Context Management

- Optimized Instruction Set for Network Operations

- Per Flow Queuing Support for up to a half million flows.

- Hardware Support for Quality (QoS) of Service Building Blocks

- Comprehensive Development Tools

- Next Generation Service Acceleration: MPLS, DiffServ, IPSec, Provisioning, AAA, Server Load Balancing, & More

Extending the Era of Performance and Flexibility

The IQ2200™ Family of Network Processors extends the successful Vitesse IQ2000 network processor family, doubling packet processing performance and improving switch fabric connectivity while maintaining firmware and pinout compatibility for rapid application.

The IQ2200 family is designed to deliver flexible, high-performance, deep-packet processing solutions at speeds ranging from DS0 to OC-48.

Applications for the IQ2200 family include complex multi-protocol routing, classification, filtering, stateful inspection, encryption, policing/policy enforcement, traffic grooming/shaping, multicast/stream management, network address translation, and other demanding packet processing operations.

Rapid system time-to-market can be dramatically improved when the IQ2200 NPU is coupled with other Vitesse solutions including Physical Layer processing devices, Traffic Managers, and High Speed Switching Fabrics.

Change is Constant...

A fundamental shift is occurring in the network-hardware-manufacturing marketplace as demands for very high-speed, service-enabled products eclipse those for more traditional layer 2/3 routing and switching offerings. The combination of hardware acceleration needs, direct support for IP services/features, and demands for longer product life-cycles with reduced time to market, has given birth to the Programmable Network Processor industry.

Hardware vendors are in need of an "adjunct" processing solution that addresses both current and future challenges in network evolution; successfully meeting these challenges through standard products is key to maintaining a competitive edge. The IQ2000 and IQ2200 families enable innovation by providing a high performance, flexible solution that meets today's challenges in networking and communication technology without the time-to-market constraints, fixed-function limitations, and short product life cycles associated with ASIC technology.

Ideal Applications

High port density applications
- OC-3 to 2xOC12 ATM/PoS PHY
- 10/100/1000 Ethernet
- Channelized OC-3 to OC-12
- DS0 - DS3 Aggregation

Standalone or Modular Systems
- Intelligent Edge Devices
- Switches and Routers
- Packet/Voice Gateways
- Service Creation Systems

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IQ2200

What to Look for in a Network Processor:

- Exceptional Processing Capability
- Scaleable Processing Architecture
- Flexibility & Programmability
- Optimized use of Co-processors and High-Performance Memory
- "Headroom" for Emerging Services
- Variety of OPEN Interconnect Mechanisms
- Control Plane Processor Independence
- Robust Software Development Environment

Vitesse Delivers all the Elements!

Service Enablement

Supports scaleable deployment of value-added IP services (from DS-0 to OC-48)

- MPLS
- IPSec
- DiffServ
- NAT

Embedded Hardware QoS Building Blocks

- RIO
- RED
- WRED
- RR
- WRR
- WFQ

Robust Development Environment

Comprehensive Developer Workbench

High-performance Debug Tools

Powerful Simulation and Test Environment

Performance Optimization Toolbox

Network Software Library (example code for routing, bridging, lookup functions, tagging, marking/re-marking, queuing, etc.)

Intelligent Network APIs

Optimized Network-Specific Functions

Performance Investment Protection

Programmability enables functional evolution with the emergence or revision of standards

Connectivity between NPUs delivers linear scaling of service delivery and performance, thus enabling terabit class system development

Architecture provides "Maximum Headroom" for emerging IP service applications

Architecture provides backward compatibility from generation to generation

RISC development environment facilitates code portability, reuse and software investment protection Control Plane Processor Independence
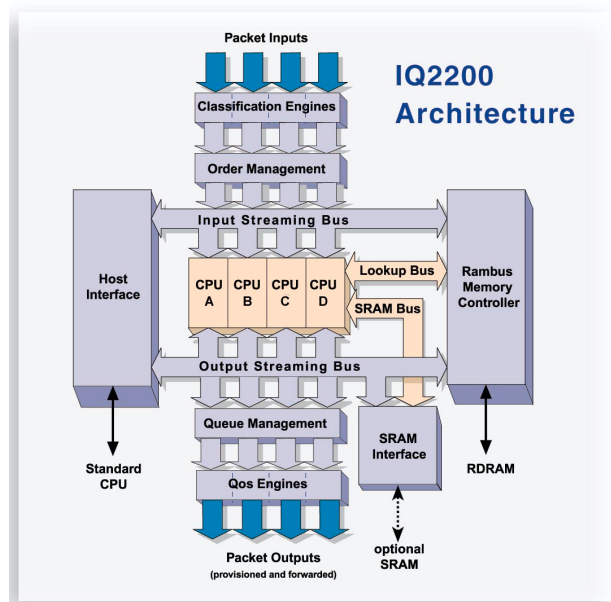
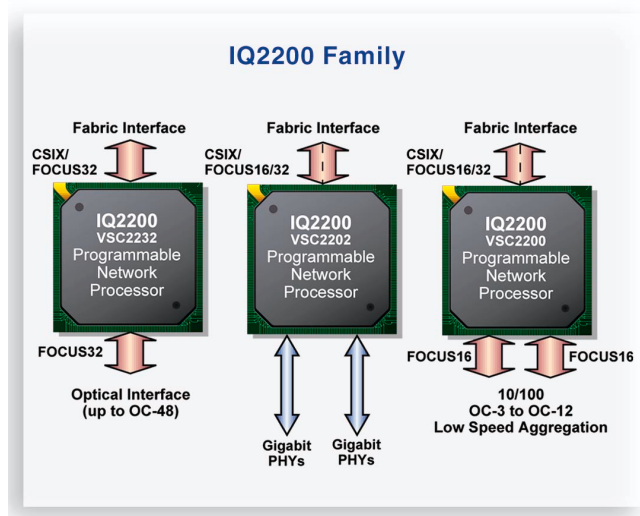## Open Architecture

Standards Based Compliance

Variety of Third Party Interfaces Supported

Variety of Third Party Application Specific Processors Supported (Policy, Security, Encryption)

Variety of Fabrics Supported through third party ASICs and FPGAs

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The IQ2200 Family Delivers High Performance Network Processing

Exceptional Processing Capability	Scaleable Architecture
■ 4 High Performance, load balanced CPUs ■ Supports high-speed Interfaces up to OC-48 ■ Packet order maintained throughout	■ Modular Architecture provides for scaleable growth
Flexibility/Programmability	**Co-Processors**
■ A totally open, programmable solution, for providing next generation services ■ Uni-processor progamming model	■ Embedded function specific Co-processors for QoS, Data Movement, Classification, Lookup, and other functions
Headroom	**Open Interconnect**
■ More Headroom than any NPU vendor ■ Margin for future features through software upgrade	■ Open Interconnect via Partner Devices (DS-0 to OC-48) and Fabrics ■ CSIX-L1 Fabric Interface
Control Plane Processor	**Robust Software Development**
■ Match the Standard Processor features/price to meet your requirements	■ Comprehensive Hardware/Software Developers Workbench

IQ2200 Architecture

Packet Inputs — Classification Engines — Order Management — Input Streaming Bus — Host Interface — CPU A, CPU B, CPU C, CPU D — Lookup Bus — SRAM Bus — Rambus Memory Controller — Output Streaming Bus — Standard CPU — Queue Management — SRAM Interface — RDRAM — Qos Engines — Packet Outputs (provisioned and forwarded) — optional SRAM

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Family of Network Processors

IQ2200 Family

VSC2232

The VSC2232 Network Processor is targeted at the Optical Network Intelligent Edge. With the CSIX or FOCUS32 interfaces, the VSC2232 supports connections to a wide variety of fabrics and optical network interfaces.

VSC2202

The VSC2202 Network processor is a Gigabit Ethernet enabled device well suited for server load balancing and service-enabled Ethernet aggregation. With two Gigabit Ethernet MACs and either one CSIX, or one FOCUS32 or two FOCUS16 interface(s), a variety of fabric or interface connections are possible.

VSC2200

The VSC2200 member of the IQ2200 family is available with either four FOCUS16 interfaces or two FOCUS16 interfaces and one CSIX or one FOCUS32 interface. The IQ2200 VSC2200 is ideally suited for service-enabled aggregation platforms providing aggregation at rates from DS0 to OC12.

IQ2200 Feature and Part Selection Guide

IQ2200 Part No.			FOCUS Port Configuration			
VSC2200	VSC2201	VSC2232	FOCUS A	FOCUS B	FOCUS C	FOCUS D
✓	✓	✓	FOCUS16	FOCUS16	FOCUS16	FOCUS16
✓	✓	✓	FOCUS16	FOCUS16	FOCUS32	
—	✓	✓	GigaMAC	FOCUS16	FOCUS16	FOCUS16
—	✓	✓	GigaMAC	FOCUS16	FOCUS32	
—	✓	✓	GigaMAC	GigaMAC	FOCUS16	FOCUS16
—	✓	✓	GigaMAC	GigaMAC	FOCUS32	
—	—	✓	FOCUS32		FOCUS16	FOCUS16
—	—	✓	FOCUS32		FOCUS32	

✓ = featured configuration   — = featured not available

* FOCUS C & FOCUS D ports also serve as the CSIX-L1 Interface

Specifications:

Performance:
- 400 MHz, 32-bit RISC processors
- Single 25 MHz crystal drives all clocks

I/O:
- 32-bit CSIX-L1 Interface up to 166 MHz
- Gigabit Ethernet MACs on Ports A, B, full-duplex
- FOCUS16: 1.6 Gbps@16-bit, full-duplex
- FOCUS32: 3.2 Gbps@32-bit, full-duplex
- MIPS SYSAD Bus: 100 MHz, 32/64-bit
- 32-bit Asynchronous Host Interface
- Rambus memory controller supports 800 MHz and 1066 MHz Direct RDRAM and SO-RIMM options

Electrical:
- 1.2V core
- 1.8V Rambus RAC
- 3.3V I/O
- 4W (typical)
- 6W (max)

Operating:
- 0° - 70° Celsius

Mechanical:
- 673 pin BGA, same as used by the IQ2000 family

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IQ2200 Network Processor

Solving the Next Generation Service Aggregation Challenge...
An Example Use of the IQ2200 Family

The IQ2200 Delivers!

- Complex Multi-Protocol Routing
- Quality of Service
- Classification
- Filtering
- Stateful Inspection
- Traffic Policing
- Traffic Grooming/Shaping
- Multicast/Stream Management
- Address Translation

IP-Based Service Enabled Aggregation Platform
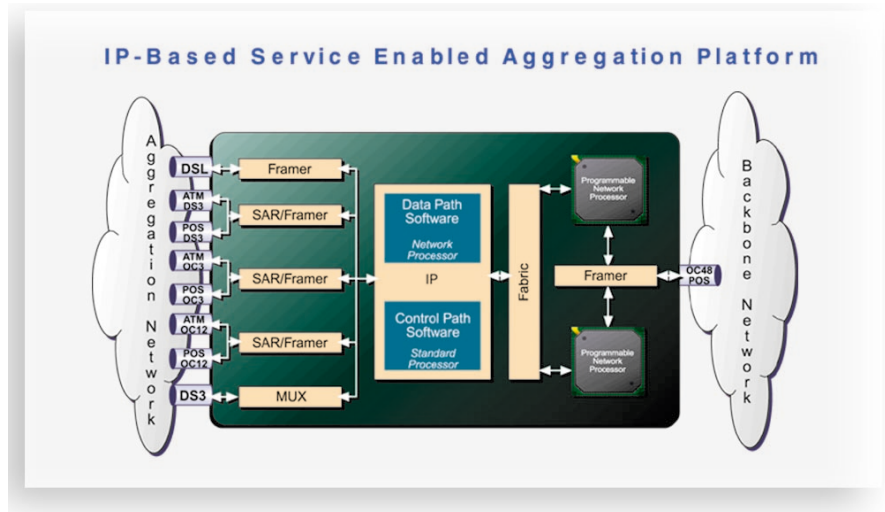
IP Based Service-Enabled Aggregation Platform

The Intelligent Edge of the PDN Transport Core must provide both data aggregation and extensive IP Services. Although these two elements conceptually work closely together, today they are performed in entirely different products (aggregation and service delivery).

Link aggregation products take data that is transported over low speed links (or potentially multiple low speed links) and assemble this data into IP Packets. This is a job of varying degrees of difficulty, depending on link type and aggregation methodology employed.

Once aggregation has occurred, services are applied on a variety of basis (flows within aggregated channels, micro-flows within flows, the channel itself, etc.). In this area, services are defined as "value-added operations" performed on a packet (tagging for MPLS, classification for DiffServ, policy enforcement, and other sophisticated services).

This design concept is unique because it provides the basis for collapsing two physically different components (with different architectures, different management facilities, and different provisioning facilities) into a single, highly integrated platform.

Ordering Information:

Model Number	Description
VSC2200	IQ2200 with 4 FOCUS16 ports, or 2 FOCUS16 ports + 1 FOCUS32 port or 1 CSIX Interface
VSC2202	IQ2200 with 2 integrated gigabit Ethernet MACs + 2 FOCUS16 ports, or 1 FOCUS32 port, or 1 CSIX Interface
VSC2232	IQ2200 with 2 FOCUS32 ports, or 1 FOCUS32 port 1 + 1 CSIX Interface

* integrated 8K and 16K instruction control store options available for each model

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